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MONTHLY REPORT

ON THE NUCLEAR FUEL MARKET

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HEADQUARTERS

Building 3, Suite 290
3000 Sand Hill Road
Menlo Park, California 94025
Telephone: (415) 854-1510
Telecopy: (415) 854-2115
Telex: 470674 (NUEXCO UI)

George White, Jr.

Christian C. Guitton

Mathias M. Klingler

Kim Peyton McDonald

R. Wesley Miller

Donald W. Radcliffe

EUROPE

13 chemin du Levant
01210 Ferney-Voltaire
France
Telephone: (33-50) 428035
Telecopy: (33-50) 428526
Telex: 385288 (NUEXCO F)

James E. Vaughan

Kathryn K. Bowen

W. Scott Hickman

James J. Lightner

NORTHEAST UNITED STATES

100 Prospect Street
Century Plaza South
Stamford, Connecticut 06901
Telephone: (203) 323-1999
Telecopy: (203) 325-1483
Telex: 4750124 (NUEXCO C)

Wayne D. Fowler

Robert J. Alexander

Earl E. Hoellen, Jr.

Teresa Elms Lindsay

SOUTHEAST UNITED STATES

Suite 905
Ten Piedmont Center
Atlanta, Georgia 30305
Telephone: (404) 262-7375
Telecopy: (404) 233-6210
Telex: 4611142 (NUEX ATL)

M. Jerry Reaves

James H. Allen

Kathleen Rouhota

(See inside back cover for list of Representatives and Consultants)

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MONTHLY REPORT ON THE NUCLEAR FUEL MARKET
May 1985 No. 201

R. WESLEY MILLER, *EDITOR* CLARK M. BEYER, *ASSOCIATE EDITOR*

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To Our Readers

Nuexco's US offices will be closed for the Memorial Day holiday on Monday, May 27, 1985.

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PRICING

NATURAL URANIUM AND SECONDARY MARKET CONVERSION

The **Exchange Value** as of April 30, 1985 is **$14.25** per pound U_3O_8, down $0.75 since last month. **Active supply** of natural uranium (U_3O_8 and UF_6) for spot or near-term delivery totals **2,720,000** pounds equivalent U_3O_8 as concentrates or UF_6, down 1,530,000 pounds since last month. The corresponding figure for **active demand** is **1,395,000** pounds, down 2,660,000 pounds. The spot and near-term **supply-demand ratio** rose to **2.0:1.**

The *Current Market Data* section of this Report lists five natural uranium sales transactions, involving a total of approximately 1,700,000 pounds U_3O_8 equivalent. All of the transactions reported this month involved deliveries before 1986, and four met the criteria for inclusion in the current Transaction Value calculation.

The **UF_6 Value** as of April 30, 1985, is **$40.50** per kilogram U in UF_6. Two of the transactions reported this month involved UF_6. This is the first time Nuexco has published a value for natural uranium hexafluoride. Over half of the natural uranium sold in 1984 for spot or near-term delivery (as reported by Nuexco) involved UF_6, and that percentage was even higher for longer-term deliveries. Furthermore, the conversion component of UF_6 when the UF_6 is being offered to buyers who prefer U_3O_8 is worth substantially less than is being paid by buyers that want secondary market conversion services *per se*. Thus, the market value of UF_6 can be somewhat less than that derived from the algebraic combination of Exchange Value plus Conversion Value.

The **Transaction Value** as of April 30, 1985 is **$14.90** per pound U_3O_8, down $0.15 since last month. The current Transaction Value includes 20 transactions involving a total of 2.9 million pounds U_3O_8 or equivalent UF_6 and covers a period of 3 months. The Transaction Value fell slightly as a result of the gradual decline of transaction prices that has taken place over the last several months.

The **Loan Use Charge Rate** as of April 30, 1985 is unchanged at **5 percent** per annum, as a lender continued to offer a substantial quantity of material at that rate.

* * *

The substantial decline in this month's Exchange Value is largely attributable to two factors that have continued the weakening of the spot/near-term market.

1. The few buyers in the market have exhibited highly discretionary tendencies, and it is unclear where the next strong demand for immediate delivery of material will emerge.

2. One US producer closed its operations and liquidated its substantial inventory in a short time at a price well below last month's Exchange Value.

An increase in market activity in February and March led to increased competition in April for lower prices for concentrates. After three months of Exchange Value stability, the market once again weakened, reflecting a renewed discretionary attitude among buyers. Much of the recent activity is occurring between producers and traders or other intermediaries, while utilities appeared to be anticipating another downward price slide.

The inventory liquidation by a US producer released a substantial quantity of U_3O_8 on the market in April. In a matter of hours the material was sold at prices well below the $15.00 level. The material had been held off the market for the past several months in connection with negotiations to sell the producer's US uranium operations. The sale of the 1.5-million-pound inventory may have signaled the end of those negotiations, but other scenarios are conceivable. Potential buyers of the company's properties may have had no near-term need for the concentrates and were unwilling to pay current market prices merely to put the material in their inventory. Also possible is the interest by the company's parent corporation in raising cash to help pay down the debt associated with the acquisition of the company.

It has not yet been possible to identify all of the buyers involved, but it is known that deliveries extend over the remainder of 1985. As noted previously by Nuexco, recovery of spot market prices cannot occur until the market is cleared of overhanging inventory such as the material sold in April. The impact on prices, while discouraging to producers, can be expected in a market dominated by discretionary buyers.

* * *

Beginning with this issue, Nuexco will publish a market value for natural uranium hexafluoride. The **UF_6 Value** is Nuexco's judgment of the price at which transactions for significant quantities of natural uranium hexafluoride could be concluded as of the date indicated. The addition of this value is a cumulative result of many factors, including the following:

1. Over half of the natural uranium sold on the spot/near-term market in 1984 (as reported by Nuexco) involved UF_6, and nearly two-thirds of the material sold in the longer-term market in 1984 involved UF_6.

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2. Transactions involving UF_6 comprised more than half of the total quantity of natural uranium sold in early 1985 (as reported by Nuexco).

3. Current demand for UF_6 is about the same as the demand for uranium concentrates.

4. Two apparently contradictory pricing situations for conversion services have been present in the market for some time. Buyers of conversion on the secondary market may have to pay close to $1.50 for the conversion to UF_6 because the few discretionary sellers in the market can command those prices. If, however, a buyer is interested in obtaining uranium concentrates, a UF_6 seller must substantially discount the price of the conversion component in its material in order to make the sale. Therefore, the present value of UF_6 is slightly less than the sum of the price of U_3O_8 plus the price of secondary market conversion.

While uranium concentrates have been the more saleable commodity in the past, inventory sales of UF_6 and other transactions involving UF_6 on the secondary market have increased enough to warrant the publication of a commercial monthly value. In some instances in the past, equating the value of UF_6 with the sum of the Exchange Value plus the Conversion Value rendered an accurate picture of market conditions. That situation remains a possibility in the future. However, present conditions demonstrate that the value of UF_6 can be somewhat *less* than the sum of the other two values. To organize a swap, the seller must find buyers who need complementary amounts of concentrates and conversion. This usually requires a price concession on the part of the UF_6 seller for the conversion component. Location differences may present obstacles to a swap, in which case there may also be some price adjustment.

The addition of a UF_6 Value will enable a clearer and more complete analysis of spot and near-term market prices for nuclear fuel. It will give a better picture of the uranium market, and will eliminate misconceptions stemming from the assumption that the sum of the U_3O_8 component and the conversion component will equal the value of UF_6.

* * *

The **Conversion Value** is **$1.50** per pound U in UF_6, up $0.50 since last month. No secondary market conversion transactions are reported. Active supply of secondary market conversion services for delivery within three years totals 550,000 pounds U as UF_6. Active secondary market demand for conversion amounts to 290,000 pounds U in UF_6.

Recent indicators in the conversion market suggest that prices in the secondary market for conversion services are approaching primary market prices. While several buyers exist, only two active sellers remain in the secondary market, and these discretionary sellers are dictating current prices. Buyers that want conversion must pay prices near $1.50 per pound U as UF_6, even though sellers of UF_6 may have to substantially discount the conversion component of their material in order to sell to a buyer that needs uranium in any form. Thus, the conversion component of UF_6 can have substantially different values, depending on the motivations of the buyer and seller. In one case, the acquisition of conversion is the primary motivation for a transaction, and a buyer must pay a higher price. In the other case, the sale of natural UF_6 feed material to a buyer that prefers concentrates is the primary motivation, so the UF_6 seller has to discount the unwanted conversion in order to compete with sellers of concentrates.

ENRICHED URANIUM AND SWUS

The Nuexco **SWU Values** as of April 30, 1985 are:

1. For **DOE origin,** a tails assay of 0.30 weight-percent U^{235}, for delivery by the end of FY86, and certifiable as excess, $95 per SWU.

2. For **other** SWUs (includes DOE origin SWUs not certifiable as excess and non-DOE origin SWUs):

   a. For delivery in calendar year 1985, $80 per SWU, unchanged;

   b. For delivery in calendar year 1986, $85 per SWU, unchanged.

One secondary market SWU transaction is reported, involving less than 50 thousand SWUs of DOE origin.

* * *

The lack of demand for DOE certifiable SWUs for delivery in FY85, as well as the April closing of the time window for satisfying the DOE requirement for 180-day notice for FY85 delivery, effectively closed the secondary market for FY85 DOE SWUs. No buyers are in the market for delivery in the next several months, so the FY85 and FY86 SWU Values have been merged into one indicator. In addition, DOE's incentive pricing offer, to which utilities were supposed to have responded by April 30, contributed to the continuing weakening in the DOE certifiable SWU market.

The lack of activity in the market for other SWUs continued throughout April. European enrichment suppliers devoted effort toward formulating equally attractive alter-

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natives to DOE's incentive pricing campaign. As in the DOE certifiable SWU market, there are virtually no buyers for FY85 SWU, although a few sellers still exist. Negotiations for 1986 deliveries, however, are taking place at present.

The deadline for USEC customers' responses to DOE's incentive pricing program proposal for enrichment passed at the end of April. As of press time, it was impossible to discern a trend in the utility responses. Some customers responded in the form of bids, while others dictated new terms as a contingency for acceptance. As speculated in the last Report, it appears that some customers have submitted bids containing different terms to DOE in order to obtain the best deal possible. Depending on the utility response, DOE may extend the response period past the April 30 deadline. In any case, preliminary reports indicate that DOE did receive enough favorable responses to justify proceeding with the incentive pricing program.

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CURRENT MARKET DATA

April 30, 1985	Market Values	Active Supply[1] (thousands)	Active Demand[1] (thousands)
EXCHANGE VALUE	**$14.25**/lb. U_3O_8	2,720	1,395
UF_6 VALUE	**$40.50**/kgU		
CONVERSION VALUE	**$1.50**/lb. U in UF_6	550	290
SWU VALUES			
DOE origin, certifiable as excess, 0.3 tails assay delivery before the end of FY86	**$95**/SWU		
Other SWUs (non-DOE or non-certifiable)			
calendar year 1985 delivery	**$80**/SWU		
calendar year 1986 delivery	**$85**/SWU		
LOAN USE CHARGE RATE	5%/annum	0	250

TRANSACTION VALUE	$/lb. U_3O_8	Millions of Pounds	Number of Transactions	Number of Months
	14.90	2.9	20	3

[1]Supply and demand tables in the *Current Market Data* section of this Report detail the numbers for each category.

DEFINITIONS

1. The **Exchange Value** is Nuexco's judgment of the price at which transactions for significant quantities of natural uranium concentrates could be concluded as of the date indicated.
2. The **UF_6 Value** is Nuexco's judgment of the price at which spot and near-term transactions for significant quantities of natural uranium hexafluoride could be concluded as of the date indicated.
3. The **Conversion Value** is Nuexco's judgment of the price at which spot and near-term transactions for significant quantities of conversion services could be concluded in the secondary market as of the date indicated.
4. The **SWU Values** represent Nuexco's judgment of the price at which transactions for the sale of significant quantities of SWUs of stated origin for delivery in the specified time period could be concluded as of the date indicated.
5. The **Loan Use Charge Rate** is Nuexco's judgment of the annual interest rate at which uranium loans could be concluded as of the date indicated.
6. The **Transaction Value** is a weighted average price of recent natural uranium sales transactions. The calculation is based on prices paid in:
   a. Transactions closed within the previous three-month period for which delivery is scheduled within one year of the transaction date;
   b. At least ten transactions;
   c. Transactions involving a sum total of at least 2 million pounds U_3O_8 equivalent.

   The sample time is extended as necessary to include these minima. Other currencies are converted to US dollars using conversion rates in effect on or near the transaction date.

DERIVATIONS AND COMMENTS

1. All Market Values are based on:
   a. Data from recently completed transactions.
   b. Data from pending transactions.
   c. Firm bids to buy or borrow, and firm offers to sell or lend.
   d. Prices purchasers or rates borrowers have expressed a willingness to pay, but for which Nuexco is not aware of firm bids to buy or borrow, and prices sellers or rates lenders have expressed a willingness to offer, but for which Nuexco is not aware of firm offers to sell or lend.
2. Prices associated with deliveries under old or renegotiated contracts or other than arm's-length transactions are not considered in the determination of these Market Values.
3. In the determination of the Conversion Value, Nuexco does not consider transportation charges other than those customarily provided by primary suppliers of conversion services.
4. The prices of conversion services or SWUs delivered under long-term contracts with primary suppliers are not considered in the determination of either the Conversion Value or SWU Value.
5. For the DOE SWU Values, Nuexco converts SWU prices at varying tails and product assays to equivalent SWU prices at a tails assay of 0.30 weight-percent U_{235} and a product assay of 3.0 weight-percent U_{235}, assuming feed costs corresponding to the Nuexco Exchange and Conversion Values determined as of the same date.
6. In calculating the Transaction Value, Nuexco does not account for the price of uranium delivered in connection with contracts which call for "market price" mechanisms. This exclusion applies particularly to contracts in which delivery prices are expressed as a function of future Exchange Values or any other indeterminant variable. Also excluded from the calculation are any other transactions in which the delivery price is defined in such a way that it cannot currently be determined.

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CURRENT MARKET DATA

EXCHANGE VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	per lb. U_3O_8 in Concentrates			per kg. U in Concentrates		
	This Month (Apr. 30, 1985)	Last Month (Mar. 31, 1985)	12 Months Ago (Apr. 30, 1984)	This Month (Apr. 30, 1985)	Last Month (Mar. 31, 1985)	12 Months Ago (Apr. 30, 1984)
Australia (dollar)	21.72	21.28	19.30	56.47	55.31	50.18
Belgium (comm. franc)	891.18	940.44	973.14	2,317	2,445	2,530
Canada (dollar)	19.49	20.53	22.73	50.66	53.38	59.10
Finland (markka)	92.47	97.66	101.66	240.41	253.88	264.30
France (franc)	135.46	143.13	147.43	352.16	372.11	383.27
FRG (mark)	44.36	46.90	48.01	115.34	121.94	124.82
Italy (lira)	28,274	29,922	29,697	73,506	77,791	77,206
Japan (yen)	3,598	3,793	4,020	9,355	9,860	10,452
Netherlands (guilder)	50.09	52.80	54.12	130.22	137.26	140.69
South Africa (rand)	27.75	28.71	22.12	72.15	74.63	57.50
Spain (peseta)	2,492	2,610	2,696	6,479	6,786	7,010
Sweden (krona)	128.49	135.01	141.21	334.06	351.00	367.11
Switzerland (franc)	37.23	38.88	39.64	96.78	101.08	103.05
UK (pound)	11.58	12.20	12.66	30.10	31.72	32.90
US (dollar)	14.25	15.00	17.75	37.05	39.00	46.15

TRANSACTION VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	per lb. U_3O_8 in Concentrates			per kg. U in Concentrates		
	This Month (Apr. 30, 1985)	Last Month (Mar. 31, 1985)	12 Months Ago (Apr. 30, 1984)	This Month (Apr. 30, 1985)	Last Month (Mar. 31, 1985)	12 Months Ago (Apr. 30, 1984)
Australia (dollar)	22.71	21.35	19.46	59.05	55.50	50.60
Belgium (comm. franc)	931.83	943.57	981.36	2,423	2,453	2,551
Canada (dollar)	20.37	20.60	22.93	52.97	53.56	59.60
Finland (markka)	96.69	97.98	102.52	251.37	254.73	266.53
France (franc)	141.64	143.61	148.67	368.22	373.35	386.51
FRG (mark)	46.39	47.06	48.42	120.60	122.35	125.87
Italy (lira)	29,563	30,022	29,948	76,858	78,050	77,858
Japan (yen)	3,763	3,805	4,054	9,782	9,893	10,540
Netherlands (guilder)	52.37	52.97	54.57	136.16	137.72	141.88
South Africa (rand)	29.02	28.80	22.31	75.44	74.88	57.99
Spain (peseta)	2,606	2,619	2,719	6,775	6,808	7,069
Sweden (krona)	134.36	135.46	142.40	349.29	352.17	370.21
Switzerland (franc)	38.92	39.01	39.97	101.19	101.42	103.92
UK (pound)	12.10	12.24	12.76	31.47	31.82	33.18
US (dollar)	14.90	15.05	17.90	38.74	39.13	46.54

[1]Calculated using currency exchange rates published in the *Wall Street Journal* on April 30, 1985.

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CURRENT MARKET DATA

CONVERSION VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	per lb. U as UF_6			per kg. U as UF_6		
	This Month (Apr. 30, 1985)	Last Month (Mar. 31, 1985)	12 Months Ago (Apr. 30, 1984)	This Month (Apr. 30, 1985)	Last Month (Mar. 31, 1985)	12 Months Ago (Apr. 30, 1984)
Australia (dollar)	2.29	1.42	0.87	5.04	3.13	1.92
Belgium (comm. franc)	93.81	62.70	43.86	206.81	138.22	96.69
Canada (dollar)	2.05	1.37	1.02	4.52	3.02	2.26
Finland (markka)	9.73	6.51	4.58	21.46	14.35	10.10
France (franc)	14.26	9.54	6.64	31.43	21.04	14.65
FRG (mark)	4.67	3.13	2.16	10.30	6.89	4.77
Italy (lira)	2,976	1,995	1,338	6,561	4,398	2,951
Japan (yen)	378.79	252.84	181.20	835.08	557.43	399.48
Netherlands (guilder)	5.27	3.52	2.44	11.62	7.76	5.38
South Africa (rand)	2.92	1.91	1.00	6.44	4.22	2.20
Spain (peseta)	262.33	174.00	121.53	578.34	383.61	267.92
Sweden (krona)	13.53	9.00	6.36	29.82	19.84	14.03
Switzerland (franc)	3.92	2.59	1.79	8.64	5.71	3.94
UK (pound)	1.22	0.81	0.57	2.69	1.79	1.26
US (dollar)	1.50	1.00	0.80	3.31	2.20	1.76

SWU VALUES AND UF_6 VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	DOE SWU Delivery by the End of FY86 (April 30, 1985)	Non-DOE SWU 1985 Delivery (April 30, 1985)	Non-DOE SWU 1986 Delivery (April 30, 1985)	UF_6 per kg. U in UF_6 This Month (April 30, 1985)
Australia (dollar)	144.82	121.95	129.57	61.74
Belgium (comm. franc)	5,941	5,003	5,316	2,533
Canada (dollar)	129.91	109.39	116.23	55.38
Finland (markka)	616.48	519.14	551.59	262.82
France (franc)	903.04	760.46	807.98	384.98
FRG (mark)	295.77	249.07	264.63	126.09
Italy (lira)	188,492	158,730	168,651	80,357
Japan (yen)	23,990	20,202	21,465	10,227
Netherlands (guilder)	333.92	281.20	298.77	142.36
South Africa (rand)	185.00	155.79	165.53	78.87
Spain (peseta)	16,614	13,991	14,865	7,083
Sweden (krona)	856.63	721.37	766.46	365.19
Switzerland (franc)	248.17	208.99	222.05	105.80
UK (pound)	77.17	64.99	69.05	32.90
US (dollar)	95.00	80.00	85.00	40.50

[1]Calculated using currency exchange rates published in the *Wall Street Journal* on April 30, 1985.

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RECENT TRANSACTIONS[1]

Uranium Sales

Nuexco Transaction Number	Delivery Period	Approximate Quantity (thousands of pounds, U_3O_8 equivalent)	Approximate Price as Percent of Current E.V.	Seller	Buyer	Remarks
3413	1985	1,001-1,500	R[5]	US Producer	R[5]	
3412	1985	101-300	100	Trader	Trader	UF_6.
3411	1985	101-300	98	Trader	US Utility	UF_6.
3409	1985	less than 50	99	US Producer	Trader	
3408	1985	101-300	101	US Producer	US Producer	

Enrichment Services
Secondary Market Sales

Nuexco Transaction Number	Delivery Period	Approximate Quantity[2] (thousands of SWUs)	Approximate Price[3] as Percent of Current SWU Value[4]	Seller Group	Buyer Group	SWU Origin	Remarks
3392	1985	less than 50	R[5]	US Utility	Trader	DOE	Tails assay swap; occurred in early 1985.

[1]Transactions listed are not limited to those in which Nuexco was involved, but also include others of which Nuexco is aware.
[2]If tails assay is unknown or unspecified, Nuexco's calculation of SWU quantity assumes 0.30 w/o tails assay.
[3]Price is not normalized to 0.30% tails assay.
[4]Refers to SWU Value that corresponds to SWUs included in transaction. When prices and SWU values are expressed as discounts (e.g., X dollars less than DOE's USEC base price at time of delivery), the percentage refers to the ratio of the *discounts*, not the ratio of the prices.
[5]The notation *R* means that Nuexco either does not know, or that Nuexco has restricted that information to protect client confidentiality.

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CURRENT MARKET DATA

URANIUM SUPPLY
(April 30, 1985)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U_3O_8) Spot or Near-term[2]	Intermediate or Long-term	Remarks
Available for Sale:			
ACTIVE			
1575	500	500 per year	
1860	400	1,500 per year	
2134*	220	220 per year	1985-87
2389*	300	—	
2392	35	—	UF_6
2510*	980	—	UF_6
2538*	30	—	
2594*	20	20 per year	1985-90
2675	35	—	UF_6
2705A*	200	—	UF_6
2263*	—	500 per year	1987-90
2625	—	250 per year	1987-89
2680	—	250 per year	1986-92
TOTAL:	2,720		
INACTIVE			
2191	125	—	UF_6
2335	275	—	
2336	250	250 per year	1985-94
2553	300	—	
2654	250	250 per year	UF_6
2297	—	200 per year	1986-89
2670	—	525	1987
TOTAL:	1,200		

*New or revised since last month.
[1]Measured from the date of this Report.
[2]For delivery within one year. This category excludes material deliverable within one year under other than spot or near-term contracts.
Projects removed since last month: 2271, 2275, 2368, 2495, 2565, 2574, 2584, 2633, 2657.

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CURRENT MARKET DATA

URANIUM DEMAND
(April 30, 1985)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U_3O_8) Spot or Near-term[2]	Intermediate or Long-term	Remarks
Inquiries to Purchase:			
ACTIVE			
2548	290	—	
2590	75	—	U_3O_8 or UF_6
2636	100	—	
2674	800	—	
2699*	130	—	U_3O_8 or UF_6
2217	—	1,000 per year	1989-95
2507	—	600	1987-89
2681	—	1,000 per year	1987-88
2748*	—	75 per year	1986-90
TOTAL:	1,395		
INACTIVE			
2576	20	—	UF_6
2695*	1,250	—	UF_6
2414	—	365	1987-88
2457B	—	650	1987
2586	—	300	1987
2643	—	150 per year	1987 on
2694*	—	625	1987; UF_6
TOTAL:	1,270		

*New or revised since last month.
[1]Measured from the date of this Report.
[2]For delivery within one year. This category excludes material deliverable within one year under other than spot or near-term contracts.
Projects removed since last month: 2244, 2419, 2442, 2540, 2574B, 2611, 2659, 2661, 2676, 2690, 2995.

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CURRENT MARKET DATA

LOAN SUPPLY AND DEMAND
(April 30, 1985)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U_3O_8) Within 1 Year	Beyond 1 Year	Remarks
Available for Loan: INACTIVE			
1938	2,000	—	UFs
2139	2,000	—	
2469A	800	—	
2483	550	—	
2667	800	—	
TOTAL:	6,150		
Inquiries to Borrow: ACTIVE			
2606*	250	—	
TOTAL:	250		

*New or revised since last month.
[1]Measured from the date of this Report.
Projects removed since last month: 2128.

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CONVERSION SUPPLY AND DEMAND
(April 30, 1985)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U as UF_6) Within 3 Years	Beyond 3 Years	Remarks
Available for Sale:			
ACTIVE			
1936*	440	550	1986-89
2051	110	—	
TOTAL:	550		
INACTIVE			
2438	500	250 per year	1986-87
2511	600	700	1986-90
TOTAL:	1,100		
Inquiries to Purchase:			
ACTIVE			
2419A	55	—	
2587*	35	—	
2602	200	—	
2617	—	275	1986-91
TOTAL:	290		
INACTIVE			
2529	225	—	
2644	—	475	1987 on
2724*	—	375	1989-93
TOTAL:	225		

*New or revised since last month.
[1]Measured from the date of this Report.
Projects removed since last month: None.

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CURRENT MARKET DATA

SWU SUPPLY AND DEMAND
(April 30, 1985)

Nuexco Project Number	Delivery Period[1] (Thousands of SWUs) Spot or Near-term[2]	Intermediate or Long-term	Remarks
Available for Sale:			
ACTIVE			
2624	100	—	
2633B	330	—	
2705*	40	—	
2359	—	200	
2517	—	155	1986-89
2571	—	55	1987
2684*	—	35	
TOTAL:	470		
INACTIVE			
2164	20	—	
2378	—	120	1988
2657	—	25	1986
TOTAL:	20		
Inquiries to Purchase:			
ACTIVE			
2655	10	—	
2713*	180	—	
2400	—	150	1987-90
2519	—	30 per year	1987 on
2653	—	100	1986-90
2658	—	5	1986
TOTAL:	190		
INACTIVE			
2543	25	25	1986
2585	—	40	1986
2500	—	170	1988
2512	—	15 per year	1987 on
2595	—	50	1986
2693	—	100 per year	1989-90
TOTAL:	25		

*New or revised since last month.
[1]Measured from the date of this Report.
[2]For delivery within one year. This category excludes SWUs deliverable within one year under other than spot or near-term contracts.
Projects removed since last month: 2100, 2285, 2510, 2513, 2578, 2631, 2664.

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THE AVLIS ENRICHMENT PROCESS

Introduction

DOE soon will decide which new technology will become the primary method used by the US enrichment program. DOE's customer base has diminished over the last three years in the face of increased competition from European enrichers and secondary market SWU sales, just as it launched a vast development and construction program amounting to billions of dollars. DOE has decided that it can no longer afford to fund two research and development programs in its effort to develop an advanced enrichment technology that will produce lower-cost SWUs. Although DOE previously wanted to select the new technology in 1988, its poor financial condition resulting from canceled enrichment contracts and high penalties for unneeded long-term contracts for electricity to run the plants dictated that the decision be made as soon as May 1985.

The two technologies under consideration are the Gas Centrifuge Enrichment Plant (GCEP), with a production facility based on current technology already under construction at Portsmouth, Ohio, and the Atomic Vapor Laser Isotope Separation process (AVLIS), under development at the Lawrence Livermore National Laboratory in Livermore, California. Increasing electricity and operational costs for gaseous diffusion, the process currently in use for all of DOE's commercial enrichment, have made DOE's prices uncompetitive with non-US enrichers, and it is probable that DOE will choose either GCEP or AVLIS as the future US enrichment technology. DOE recently decided to delay for two years the completion of the 13.2 million SWU per year GCEP plant. Should DOE decide to proceed with the centrifuge technology, the two-year delay would allow for better cash flow and SWU demand projections. (For a discussion of the gas centrifuge process, see the article on Urenco in Report 191, June 1984.)

Enrichment Technologies

The commercial technologies employed by the world's enrichers are based on exploiting the small differences in mass between the two most common uranium isotopes. The lighter, fissionable U_{235} atoms, 0.711 percent of natural uranium, are separated from the slightly heavier U_{238} atoms by either gaseous diffusion or gas centrifugation.

Gaseous diffusion operates on the principle that the lighter U_{235} atoms will travel through a cascade of porous barriers faster than the U_{238} atoms. In equilibrium, all molecules will have the same kinetic energy distribution. Because $U_{235}F_6$ is slightly faster ($E_0 = \frac{1}{2} M_1V_1^2$) than $U_{238}F_6$ ($E_0 = \frac{1}{2} M_2V_2^2$), it will strike the porous barrier more often than $U_{238}F_6$, and thus will have a slightly higher probability (approximately 1.0012:1) of penetrating the porous barrier than will the $U_{238}F_6$. Since the probability differential for any one barrier is so small, many stages are required to achieve significant enrichment. About 1,250 stages are necessary for 3-percent U_{235} enrichment. Thus, diffusion is a very energy-intensive process, requiring large plants and high electricity consumption. US DOE, Eurodif, and Techsnabexport (USSR) utilize gaseous diffusion plants.

Gas centrifugation also exploits the difference in mass, using a rotating cylinder to spin the heavier U_{238} isotope to the outer walls so that the U_{235} can be drawn out of the middle of the cylinder. This process requires significantly less power per unit of output, and gas centrifugation has an advantage in that capacity can be added in smaller increments, thereby lessening the capital risk. Urenco, which operates three gas centrifuge plants, has a present capacity of 1.4 million SWU per year, which is scheduled to be increased to 2 million SWU per year by 1987-88. Should new orders arrive, further capacity will be added, reaching 3 million SWU per year by 1990.

AVLIS is based on a fundamentally different concept than the other methods. Different isotopes of the same element, though chemically identical, have different electron energy levels. As a result, different frequencies or colors of light are absorbed by each isotope, giving it a distinct color signature (Figure 1). AVLIS exploits the different quantum energy absorption properties of the different isotopes (not necessarily uranium). When a high-energy laser beam tuned to the precise frequency passes through elemental uranium in a vapor state, the photons excite the electrons of only the selected U_{235} isotope, a process known as photoionization. The U_{235} atom emits an electron and becomes a positively charged ion. The ion then can be separated electromagnetically (Figure 2).

While full production capabilities have not been demonstrated, AVLIS has several inherent advantages over the other processes.

1. High isotopic selectivity provides full enrichment (from 0.7 percent U_{235} to 3.2 percent U_{235}) in a single step, achieving a very high throughput per equipment module.

2. Because of its fundamental selectivity advantage over diffusion and centrifugation, for a given capacity AVLIS requires less equipment and electricity, and a sig-

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BASIC CONSIDERATIONS

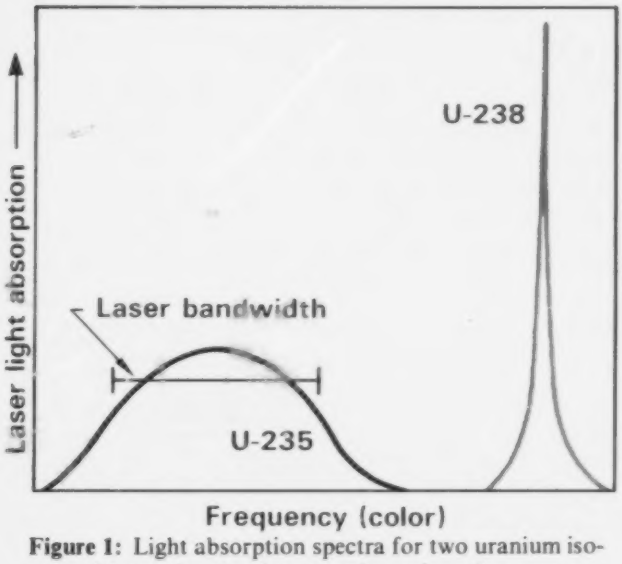

Figure 1: Light absorption spectra for two uranium isotopes, illustrating that by properly tuning a laser system, one isotope (U_{235}) can be selected for photoionization and extraction, to the exclusion of the other (U_{238}).

nificantly smaller plant, than the other technologies. This results in lower capital and operating costs.

History of AVLIS

In the early 1970s, many ideas for separating isotopes were present in the scientific community. The applications of isotope separation included military, industrial, medical, and commercial uses as well as that of uranium enrichment. Los Alamos National Laboratory was developing a molecular UF_6 laser separation process, (MLIS), and a plasma separation process (PSP) was under exploration at TRW in California. In addition, Exxon Nuclear and AVCO-Everett Research Lab conducted research in the atomic uranium process through a jointly-owned subsidiary, Jersey Nuclear-AVCO Isotopes, Inc. (JNAI). The program initiated at Lawrence Livermore National Lab (LLNL) in 1973 under contract from DOE was designed to improve the economics of isotope separation. DOE had assigned LLNL the task of evaluating alternative processes to those under development by Los Alamos and JNAI. LLNL chose to explore the various technology options for atomic uranium vapor separation. When the program was in the developmental stages, research aimed at scientific rather than economic feasibility, but early successes allowed researchers to focus on the overall objective of low-cost enrichment.

In 1974, scientists succeeded in separating U_{235} by means of a two-step photoionization technique, which was followed by the separation of milligram quantities of reactor-grade U_{235} in early 1975. Atomic uranium vapor was produced by heating uranium metal in a water-cooled copper crucible with an electron beam in order to achieve the extremely high temperature needed for vaporization. Part of the development effort throughout the 1970s aimed at solving the problems associated with producing industrial-scale quantities of uranium vapor, which is corrosive at such high temperatures, and has an extremely low vapor pressure. It also was necessary to develop a separation chamber that could direct the rapidly-moving vapor stream toward a laser and onto separate collector plates for the product and waste material.

Laser Technology

Much of the AVLIS research at LLNL over the past decade focused on laser technology requirements. Study ranged from the accuracy of frequency and pulse generation to the large-scale engineering required for industrial use. Scientists experimented with various laser sources, such as xenon-chloride and krypton-fluoride lasers, and finally in 1979 chose copper vapor lasers pumped through dye process lasers as the system to generate the proper color and power for U_{235} photoionization. Because of a high pulse repetition frequency and its generation of visible light instead of ultraviolet, the copper vapor laser proved to be the preferred means of photoionization. The laser is self-contained, utilizing its waste discharge heat to maintain the copper vapor in a gaseous state. In addition, the structure of the laser-pumped dye system allows the construction of high average power systems which can achieve high system availability and relatively long operational periods.

Figure 3 is a simplified diagram of the laser module. The process dye laser consists of master oscillator/power-amplifier chains. The master oscillator generates the precise color and pulse shape needed for the application, and the amplifiers increase the beam power. The copper vapor lasers serve as the pump laser, energizing the process dye lasers. The dye lasers pass through a flow channel containing dye dissolved in alcohol. The green copper vapor pump laser penetrates the flowing dye solution, and the red-orange process lasers are beamed through the dye, removing the energy deposited by the pump laser. Hence, energy from the pump laser amplifies the precisely-tuned red-orange process beam.

Because the dyes can absorb and re-emit light over all the shades of red and orange in a given dye, the precise

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color signature is made in the oscillator. The process beam then passes through successive dye amplification stages to increase its power. The amplifiers have no color selectivity, and will amplify any color within the dye bandwidth.

Separator Module

The separator consists of a large tank that houses the vaporizer and the collection plates (Figure 4). LLNL has been testing a half-scale separator since 1981, and the full-scale demonstration model is approaching completion. The Separator Demonstration Facility is scheduled to begin operation in 1986, and production-cycle demonstrations are scheduled for early 1987. It will be capable of enriching at the rate of approximately one million SWU per year. The objective of the separator development program has been to achieve an economical separator module, including maximum energy efficiency and durable mechanical components under high temperatures. In the current design, full enrichment from 0.7 percent U_{235} to 3.2 percent U_{235} is achieved in a single pass through the separator. Thus, for each six kilograms of unenriched uranium feed, the module produces one kilogram of enriched product in one pass.

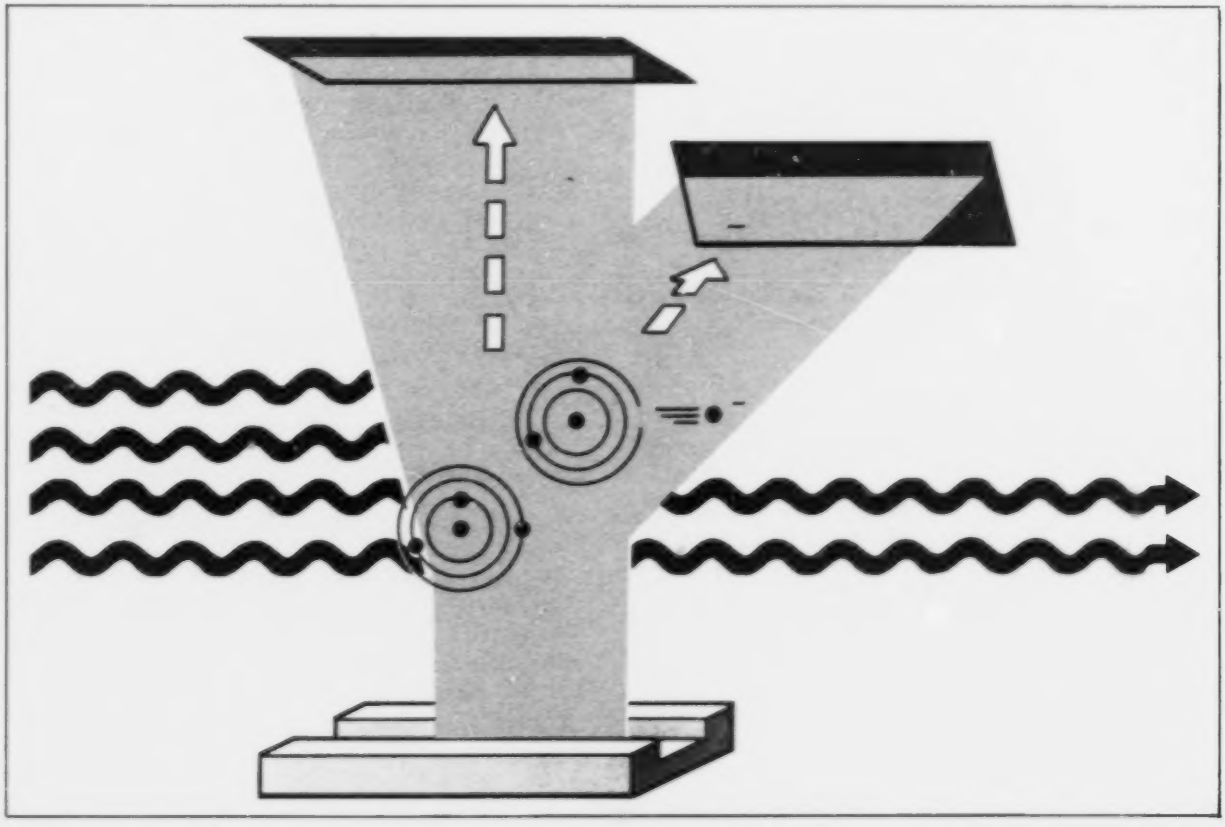

Figure 2: AVLIS schematic representation for two isotopes of uranium. The red laser light is tuned to electron energy levels of U_{235}, but not U_{238}. The U_{235} atom absorbs the precisely-color-tuned laser energy and ejects an electron (photoionization). The U_{235} atom left with a net positive charge is diverted by an electromagnetic field, while neutral U_{238} moves on unaffected.

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BASIC CONSIDERATIONS

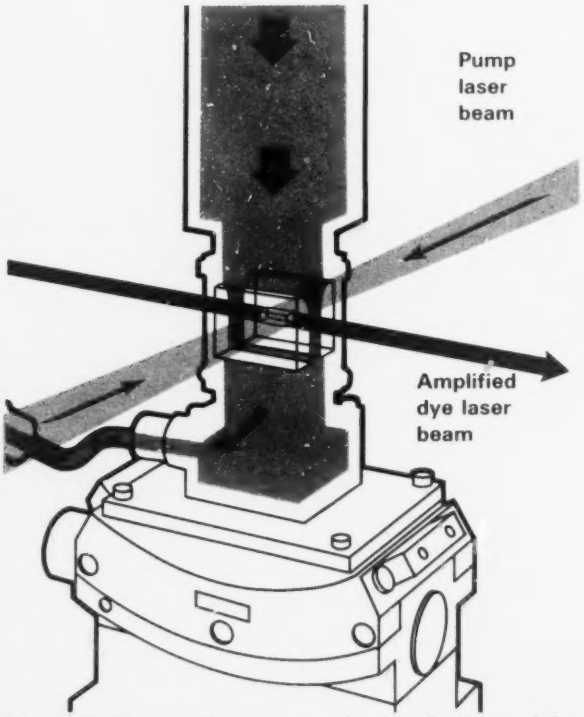

Figure 3: Dye amplifier schematic, showing flow of dye stream and intersection of dye and pump laser beams in a small flow channel.

Demonstration Facility

The Separator Demonstration Facility is part of the AVLIS Full-Scale Demonstration Facility now under construction at Livermore. It will be a plant-scale system, the prototype for commercial development of AVLIS. The plant has the capability to convert natural UF_6 to uranium metal, and convert the enriched metal back to UF_6 after vaporization. Operations procedures and personnel training techniques will be developed in the facility. At present, the objective of the facility is to firmly establish AVLIS capital and operating costs, and technology improvements are expected as the plant becomes operational. If DOE chooses AVLIS as its primary enrichment technology for the future, it may decide to use the demonstration facility for training personnel or to solicit commercial and industrial participation. DOE may consider private-company participation in the development, operation, financing and ownership of AVLIS projects outside of the LLNL facility.

Ownership alternatives range from full government ownership and funding to a direct transfer to the private sector. A number of issues that would have to be resolved before a direct transfer would be possible include regulation and licensing under the Atomic Energy Act of 1954 and the Nuclear Regulatory Commission (NRC). A joint venture between DOE and a private company could avoid some of those restrictions. Nevertheless, some kind of congressional approval probably would be required. A phased transfer is a more likely scenario. In this approach, AVLIS would be developed as a commercial project with significant DOE involvement. Sponsor companies would structure the financial and commercial arrangements, and manage the engineering and construction of the project. Then, depending on the agreement reached, the facility could be sold to one or more private company bidders, or DOE could assume ownership and let the sponsor group continue to run the plant, or find a new operator. There are many possible alternatives, and the details are contingent on DOE's decision in May on whether to emphasize AVLIS.

Although the effort at LLNL has been directed toward uranium enrichment and the DOE decision, the technology is capable of a range of commercial applications in isotope separation. The isotopes of most elements can be separated by lasers. For example, increasing the percentage of mercury-196 in fluorescent lamps substantially improves their efficiency. Isolating gadolinium isotopes for fuel rods and the removal of useful isotopes from spent fuel are other possible laser isotope separation applications in nuclear power.

Enrichment Cost

Cost comparisons between AVLIS and GCEP are complicated by insufficient demonstration and capital cost data, in addition to the impact of variables such as monitoring and regulation costs which are as yet uncertain. However, proponents of the AVLIS system have concluded that lower production costs will allow DOE to lower the price of enrichment to compete with other enrichers, while also permitting full cost recovery. Future SWU costs depend on market conditions, production costs, future demand, capacity increases and technological advances. LLNL's estimates for AVLIS SWU costs depend on the size of the plant, when it is deployed, and many other considerations. LLNL recently submitted to DOE's Process Evaluation Board a projected figure of $49 per SWU. Proponents of the GCEP dispute that figure, and reliable cost projections probably will not be available until the Demonstration Facility reaches full operation in 1987.

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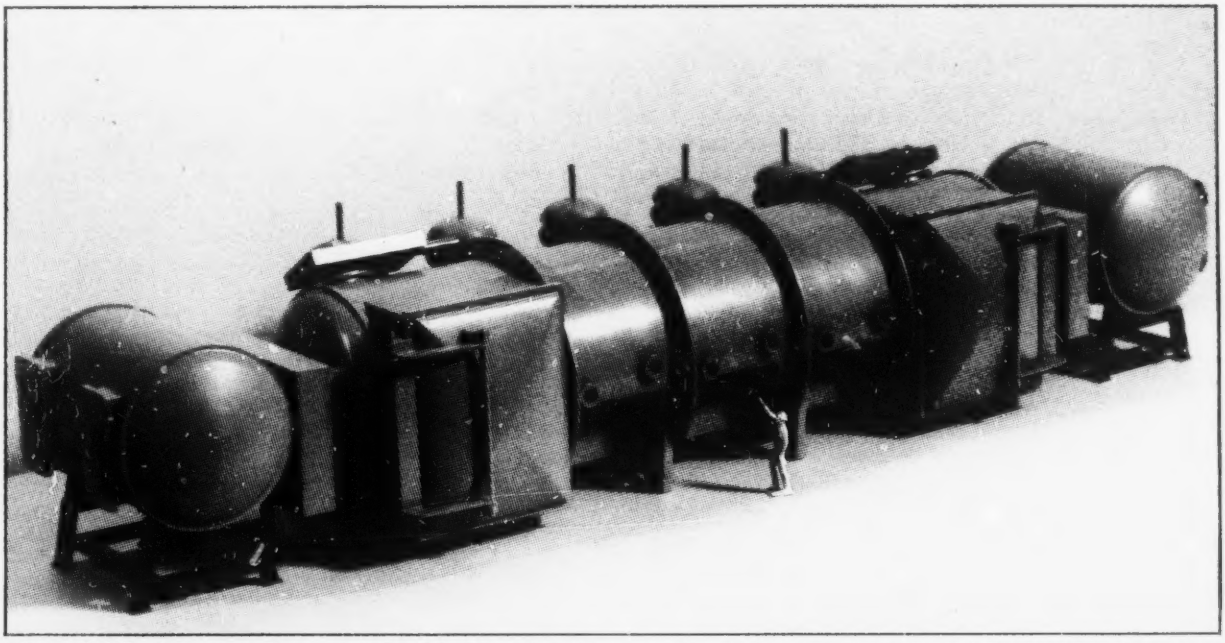
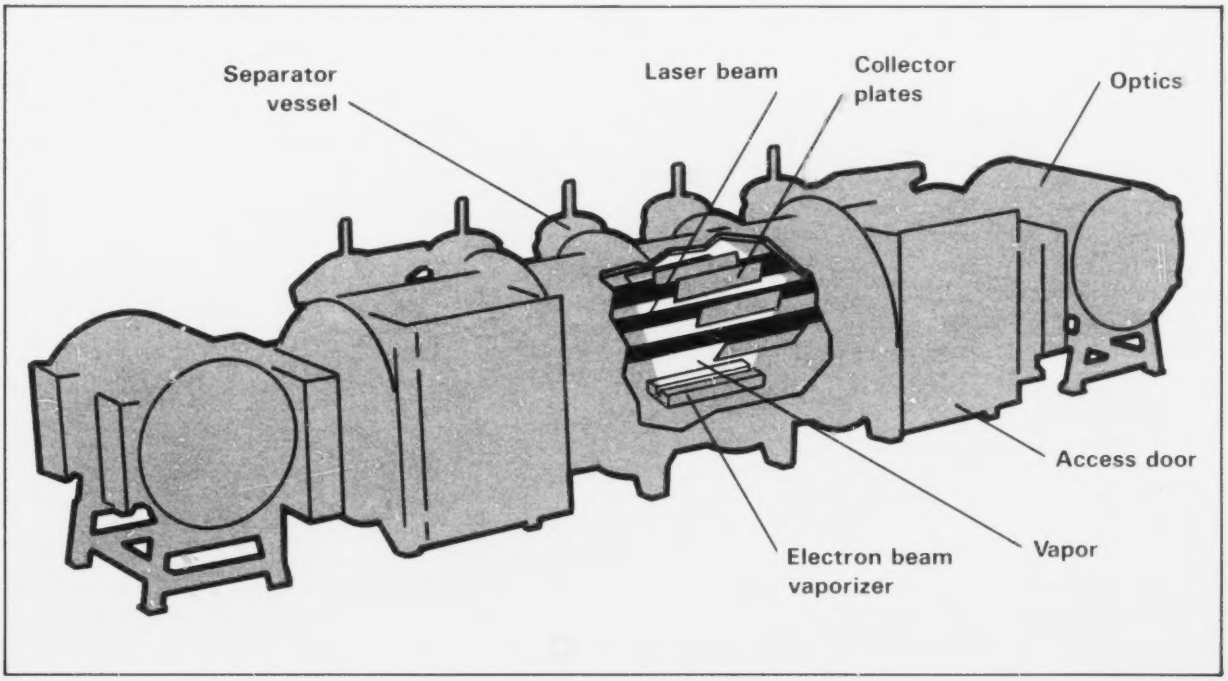


Figure 4: The Separator Demonstration Module (above), currently under construction at LLNL, is scheduled for activation in 1985-86. The schematic below shows the primary internal parts of the separator module in the LLNL Full-Scale Demonstration Facility.



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RECENT DEVELOPMENTS

SOUTH AFRICA

First-quarter 1985 uranium production from Chamber of Mines producers totaled 3,145,000 pounds U_3O_8, a seven-percent decline from the fourth quarter of 1984 (Table 1). Production was 22 percent less than the 3,848,000 pounds U_3O_8 produced in the first quarter of 1984. Some specific comments on various production sites are as follows.

1. There was no production this quarter from Blyvooruitzicht or Beisa (St. Helena), both of which ceased operations in the fourth quarter of 1984.

2. Significant production declines occurred at Dreifontein Consolidated (26 percent), JMS (Free State Joint Metallurgical Scheme) (22 percent), and Western Deep Levels (20 percent). Most of these declines stemmed from decreased throughput and yield, and are likely to persist as long as uranium market conditions remain unfavorable.

3. Production fell 46 percent at Chemwes (Stilfontein) due to a 40-percent cutback in tons treated and an 11-percent decline in yield. The Chairman of Stilfontein, Mr. J.C. Fritz, stated in his annual review of March 8, 1985, that production has been provisionally reduced to 60 percent of capacity due to reduced current demand. Negotiations with the mine's primary customer are continuing and the outcome will be announced as soon as a conclusion is reached.

4. Production increased ten percent at Vaal Reefs due to a higher tonnage throughput, and increased eight percent at Buffelsfontein due to an increase in yield and tons treated.

Mr. E.P. Gush, Chairman of Vaal Reefs and Western Deep Levels, stated the following in his annual reviews dated March 11, 1985:

"In the uranium market, increased production in Canada more than offset the production cutbacks elsewhere, especially in the United States. Supply from production as well as inventory liquidation exceeded utilities' requirements during the year. This, together with aggressive sales programmes from certain large, low-cost producers served to reverse the modest improvement of spot-market prices seen in 1983 and to push prices to their lowest level in more than ten years."

"The short-to-medium-term outlook for the uranium market has also deteriorated with the introduction by the United States Department of Energy of a revised enrichment contract. The effect of this more competitive contract will be to postpone enrichment feed requirements and consequently the demand for uranium."

Table 1

REPUBLIC OF SOUTH AFRICA: RECENT URANIUM PRODUCTION[1]
(Thousands of pounds U_3O_8)

Operation	Fourth Quarter 1984	Total 1984	First Quarter 1985
Beisa (St. Helena)	16	794	0
Blyvooruitzicht	85	514	0
Buffelsfontein	371	1,352	401
Chemwes (Stilfontein)	276	1,155	148
Dreifontein Consolidated	61	351	45
ERGO[2]	84	362	83
Harmony	255	1,095	256
Hartebeestfontein	237	963	239
JMS[3]	402	1,316	314
Randfontein	297	1,306	291
Vaal Reefs	1,052	4,328	1,156
Western Areas	163	673	150
Western Deep Levels	78	322	62
TOTAL	3,377	14,531	3,145

[1] Excludes Palabora Mining Company, which is not a member of the Chamber of Mines.
[2] ERGO = East Rand Gold and Uranium Co. Ltd.
[3] JMS = Free State Joint Metallurgical Scheme.

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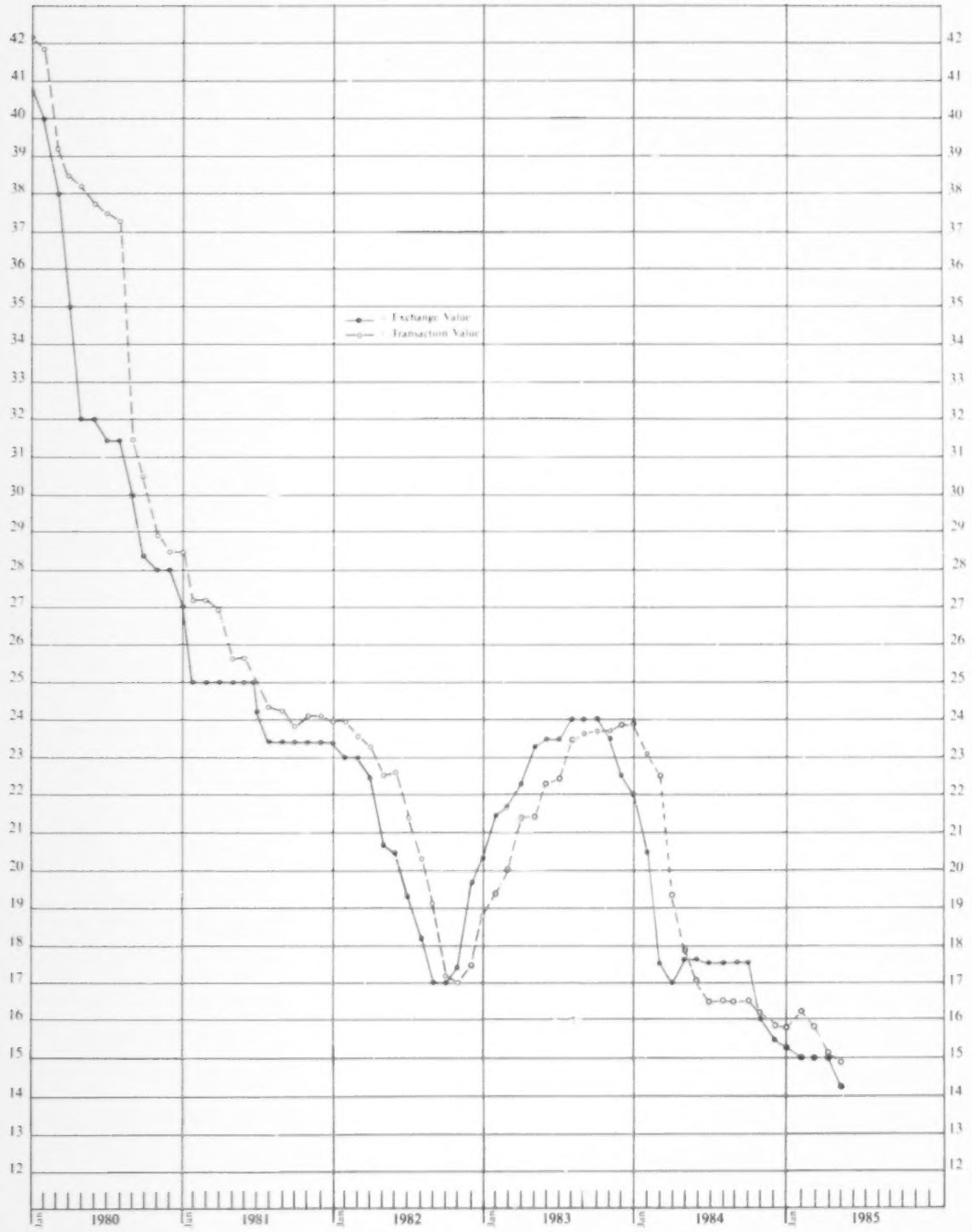
HISTORICAL MARKET DATA

EXCHANGE AND TRANSACTION VALUES SINCE JANUARY 1980

Determined as of the last day of the month indicated



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HISTORICAL MARKET DATA

HISTORICAL EXCHANGE VALUES

Determined as of the last day of the month indicated (US Dollars/lb. U_3O_8)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1968	—	—	—	—	—	—	—	6.35	6.35	6.40	6.45	6.50
1969	—	6.35	6.10	6.10	6.25	6.25	6.20	6.20	6.15	6.15	6.15	6.20
1970	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.20	6.15	6.15	6.15	6.15
1971	6.20	6.20	6.20	6.20	6.15	6.05	6.00	5.95	5.95	5.95	5.95	5.95
1972	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95
1973	5.95	6.00	6.10	6.20	6.45	6.50	6.50	6.50	6.50	6.50	6.75	7.00
1974	7.70	7.90	8.00	9.00	9.50	10.50	11.50	12.00	12.50	14.00	14.75	15.00
1975	16.00	16.00	18.00	20.00	21.00	23.00	24.70	26.00	26.00	28.50	30.00	35.00
1976	32.50	37.00	39.25	40.00	40.00	40.00	40.00	40.40	41.00	41.00	41.50	41.00
1977	41.35	41.50	41.60	41.60	42.00	42.25	42.25	42.25	42.40	42.75	43.20	43.20
1978	42.90	43.25	43.25	43.25	43.40	43.40	43.40	43.10	43.25	43.00	43.25	43.25
1979	43.25	43.25	43.25	43.25	43.25	43.00	42.70	42.70	42.20	42.20	41.00	40.75
1980	40.00	38.00	35.00	32.00	32.00	31.50	31.50	30.00	28.50	28.00	28.00	27.00
1981	25.00	25.00	25.00	25.00	25.00	24.25	23.50	23.50	23.50	23.50	23.50	23.50
1982	23.00	23.00	22.50	20.75	20.50	19.25	18.25	17.00	17.00	17.50	19.75	20.25
1983	21.50	21.75	22.25	23.25	23.50	23.50	24.00	24.00	24.00	23.50	22.50	22.00
1984	20.50	17.50	17.00	17.75	17.75	17.50	17.50	17.50	17.50	16.00	15.50	15.25
1985	15.00	15.00	15.00	**14.25**								

HISTORICAL TRANSACTION VALUES

Determined as of the last day of the month indicated (US Dollars/lb. U_3O_8)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1976	—	—	—	—	39.60	39.70	39.70	40.40	40.30	40.60	40.70	40.70
1977	41.30	41.30	41.40	41.50	42.80	42.90	43.00	42.60	42.50	42.80	42.90	42.90
1978	43.10	43.30	43.70	43.60	43.60	43.20	43.30	43.40	43.40	43.60	43.40	43.70
1979	43.60	43.80	43.70	43.40	43.60	43.70	43.70	43.60	43.60	43.60	43.50	42.30
1980	42.00	39.30	38.60	38.40	37.90	37.60	37.30	31.60	30.60	29.00	28.70	27.70
1981	27.20	27.20	27.00	25.70	25.70	24.50	24.40	24.30	23.90	24.10	24.10	24.00
1982	24.00	23.70	23.40	22.60	22.70	21.50	20.30	19.10	17.30	17.00	17.55	18.80
1983	19.35	20.00	21.35	21.40	22.35	22.45	23.50	23.60	23.65	23.65	23.85	23.85
1984	23.05	22.50	19.25	17.90	17.00	16.50	16.60	16.40	16.55	16.05	15.90	15.90
1985	16.20	15.70	15.05	**14.90**								

HISTORICAL CONVERSION VALUES

Determined as of the last day of the month indicated (US Dollars/lb. U as UF_6)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1981	1.20	1.20	1.20	1.40	1.15	1.15	1.15	1.10	1.10	1.10	1.20	1.20
1982	1.20	1.20	1.20	1.20	1.00	1.00	1.00	0.90	1.10	1.60	1.45	1.45
1983	1.20	1.40	1.40	1.20	1.20	1.20	1.10	1.10	1.00	0.60	0.60	0.60
1984	0.60	0.30	0.80	0.80	0.80	0.00	0.00	0.80	1.00	1.00	0.80	0.80
1985	1.00	1.00	1.00	**1.50**								

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GOVERNMENT STATISTICS

AUSTRALIA

	Price Index of Materials Used in Manufacturing Industry—All Groups[1] (1969=100)	Award Rates of Pay Indexes Australia—Adult Males In Mining Wage and Salary Earners, Weekly Rates[2] (1976=100)
1983 Avg.	401.2	181.8
Jan 1984	399.2	188.6
Feb 1984	402.5	188.5
Mar 1984	403.9	188.3
Apr 1984	404.2	196.2
May 1984	403.8	197.0
Jun 1984	404.9	197.0
Jul 1984	408.5	197.0
Aug 1984	413.3	197.0
Sep 1984	412.1	197.0
Oct 1984	408.6	197.0
Nov 1984	407.3R	197.0
Dec 1984	406.0	197.0
Jan 1985	409.3	197.0
Feb 1985	—	197.0

P = Preliminary R = Revised since last month

CANADA

	Industry Selling Price Index: Manufacturing[1] (1971=100)	Wage-earner Data: Average Hourly Earnings (C$)[2]					
		Uranium Mines (SIC 057)	Metal Mines* (SIC 051-059)	Mines, Quarries and Oil Wells[3] (SIC 051-099)	Primary Metal Industries Non-ferrous[4] (SIC 296)	(SIC 298)	Chemicals and Chemical Products[5] (SIC 372-379)
1983 Avg.	298.8	—	—**	14.30	—	—	11.17
Jan 1984	305.4	17.74	15.27	14.74	11.91	10.84	11.69
Feb 1984	306.6	17.78	15.59	14.90	12.04	10.82	11.51
Mar 1984	308.7	18.05	15.52	14.82	12.14	10.84	11.58
Apr 1984	310.5	18.06	15.83	15.10	11.96	10.34	11.63
May 1984	310.6	18.48	15.64	15.06	12.11	10.16	11.65
Jun 1984	311.0	18.08	15.48	14.80	12.38	10.40	11.66
Jul 1984	312.7	17.81	15.72	14.92	12.53	10.18	11.82
Aug 1984	312.7	17.24	15.36	14.92	12.44	10.34	11.78
Sep 1984	312.3	17.68	15.96	15.34	12.51	10.52	11.90
Oct 1984	312.3	17.64	16.15	15.26	12.69	10.56	11.96
Nov 1984	313.6	18.04	16.13	15.43	12.47	10.51	11.96
Dec 1984	314.2	17.95	16.39	15.60	12.16	10.40	11.99
Jan 1985	315.8R	18.05R	16.13R	15.60R	12.32	10.80R	12.04R
Feb 1985	316.4R	18.74P	16.40P	15.71P	12.55P	11.13P	11.99P
Mar 1985	317.5P	—	—	—	—	—	—

P = Preliminary R = Revised since last month

For annual averages prior to 1983, and for notes pertaining to these statistics, see pages 23-26 of Report 190 of June 1984.

*The 1980 average for Metal Mines was incorrectly reported as 10.59. The correct average is 10.58 (see Report 190).

**Two different methods were used in the 1983 "Metal Mines" category in reporting survey data, and Statistics Canada did not publish a 1983 average. The March 1983 figure for the old method was 14.73 and for the new method was 14.84. The published average for 1983 in Report 190 was a Nuexco calculation based on the available monthly statistics for 1983 with the exception of the March figure, where only the 14.84 value was taken into account.

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GOVERNMENT STATISTICS

REPUBLIC OF SOUTH AFRICA

	Average Declared Working Costs per per Metric Ton of Gold Ore Milled (Rand)[1]	Tonnage-Weighted Index of Average Working Costs per Metric Ton of Gold Ore Milled (March 1982=100)[2]	Consumer Price Index[3] (1975=100)[4]	Producer Price Index All Groups[5] (1975=100)	Total Employment in Mining and Quarrying (Code 35)[6]	Total Salaries and Wages in Mining and Quarrying (1,000 Rand) (Code 40)[6]
1983 Avg.	51.87	115.0	262.2	274.8	696,579	3,644,772
Jan 1984	—	—	274.7	283.3	689,807	326,619
Feb 1984	—	—	278.4	286.5	702,553	335,906
Mar 1984	55.30	123.1	281.9	288.0	715,628	342,332
Apr 1984	—	—	286.1	290.2	712,963	327,550
May 1984	—	—	288.3	292.6	710,040	327,937
Jun 1984	56.95	126.2	291.2	295.3	717,009	347,121
Jul 1984	—	—	295.1	296.0	717,121	369,964
Aug 1984	—	—	297.0	300.8	721,905	361,357
Sep 1984	60.64	133.2	299.9	304.1	721,470	359,218
Oct 1984	—	—	303.7	308.7	717,865	363,755
Nov 1984	—	—	307.4	312.8	717,396	369,771
Dec 1984	62.92	138.6	309.4	315.9	701,198	365,234
Jan 1985	—	—	177.1*	166.6*	—	—
Feb 1985	—	—	182.8*	171.3*	—	—
Mar 1985	—	—	183.6*	—	—	—

*The basis for calculation for these indices has been revised to January 1980 = 100.

UNITED STATES

	Producer Price Index[1]		Consumer Price Index[2]	GNP Implicit Price Deflator[3]	Gross Average Hourly Earnings of Production or Non-supervisory Workers (US$)[4]			
	Industrial Commodities (1967=100)	All Commodities (1967=100)	(1967=100)	(1972=100)	Metal Mining (SIC 10)	Primary Non-ferrous Metals (SIC 333)	Chemicals and Allied Products (SIC 28)	Electric and Electronic Equipment (SIC 36)
1983 Avg.	315.8	303.1	298.4	215.63	12.57	13.43	10.59	8.65
Jan 1984	319.1	308.0	305.2	—	12.67	13.38	10.91	8.88
Feb 1984	320.6	308.9	306.6	—	12.81	13.34	10.90	8.86
Mar 1984	321.9	311.0	307.3	220.58	12.85	13.33	10.95	8.88
Apr 1984	322.5	311.4	308.8	—	12.91	13.30	10.97	8.89
May 1984	323.3	311.7	309.7	—	12.99	13.37	11.02	8.89
Jun 1984	323.9	311.4	310.7	222.40	12.96	13.40	11.03	8.91
Jul 1984	324.0	312.0	311.7	—	13.02	13.36	11.12	8.95
Aug 1984	323.5	310.9	313.0	—	13.10	13.51	11.13	9.00
Sep 1984	322.3	309.5	314.5	224.57	13.20	13.39	11.23	9.08
Oct 1984	323.2	309.4	315.3	—	13.23	13.53	11.32	9.09
Nov 1984	323.8	310.4	315.3	—	13.23	13.76	11.35	9.15
Dec 1984	323.0	309.9	315.5	226.10	13.28	13.66	11.37	9.27
Jan 1985	323.2	309.8	316.1	—	13.25R	13.71R	11.42R	9.28R
Feb 1985	322.5	309.2	317.4	—	13.30P	13.74P	11.42R	9.27R
Mar 1985	322.6	308.7	318.8	229.01	—	—	11.41P	9.34P

P = Preliminary R = Revised since last month

For annual averages prior to 1983, and for notes pertaining to these statistics, see pages 23-26 of Report 190 of June 1984.

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REPRESENTATIVES AND CONSULTANTS

AUSTRALIA

Peter Stork
Oratom Consulting*
5 Gould Ave.
St. Ives
NSW 2075, Australia
Telephone: (61-2) 449-6783
Telex: 23976 (COMTLX)

JAPAN

Kazy Yokota
Japan Tech Services*
Ohkura Building (3F)
1-4-10 Shiba Daimon
Minato-ku, Tokyo, Japan
Telephone: (81-3) 431-6031, 6025
Telex: 242-5060 (JATECH J)

SOUTH AFRICA

Chris L. Von Christierson
Southern Prospecting (Pty) Limited*
P.O. Box 61409
Marshalltown 2107
Republic of South Africa
Telephone: (27-11) 838-1868
Telex: 4-89878 SA

TAIWAN

Edward Bee
Bee & Liang Company, Ltd.*
14 FL Universal Business Center
NO. 663, Tun Hwa South Road
P.O. Box 1396
Taipei, Taiwan R.O.C.
Telephone: (886-2) 704-9630
TWX: 785-11570 (BEELIANG)

UNITED STATES

Harold C. Lindberg*
83-A Hardee Lane
Whispering Pines, N.C. 28327
Telephone: (919) 949-3622

Ralph O. Smith*
141 Braemar Drive
Cheshire, Connecticut 06410
Telephone: (203) 272-6246

SPECIAL CONSULTANTS

James C. C. Stewart
U.K. Nuclear Industry

Claus C. Thiesen
Japan Nuclear Industry

W. Bryan Webster
International Business Development

*Independent contractors representing Nuexco